A BRASSIERE HAVING A SPACER FABRIC AND A METHOD OF MAKING SAME

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Patent Application Serial No. 60/448,647 filed on February 19, 2003.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The present invention relates generally to brassieres. More particularly, the present invention relates to a brassiere having a spacer fabric layer in the breast cups, and a method of making same.

2. Description of the Related Art

[0003] A brassiere commonly has a front panel with a pair of breast cups. The brassiere also has a pair of side portions with each side portion being connected to a breast cup on a first end and having a second end for extending about the torso of the wearer. The brassiere further has a fastener for securing the side portions about the wearer. The brassiere may also have a pair of shoulder straps.

[0004] Brassieres are worn to provide support to the breast of the wearer. Accordingly, it has become common to provide support brassieres. These support brassieres have

multiple layers in the breast cups. Such brassieres commonly have one or more breast cup layers. These layers have an inner layer for providing a soft feel against the wearer's breast, an outer layer for providing a finished look to the brassiere, and a support material positioned between the layers. Preferably, the inner and outer breast cup layers are connected at their peripheral edges to enclose the support material. Materials used for breast cup support material include, polyester or fiberfill, Lycra, plastic, silicon, and molded foam.

[0005] While support brassieres are functional and provide much needed support and comfort to the wearer, the support materials limit air circulation around the breast area, and constrict the breast tissues. Thus, such brassieres, when worn for an extended period of time, will cause discomfort to the wearer because air does not circulate easily through commonly used support materials, such as molded foam. The wearer may feel uncomfortably warm or sweaty, especially during exercise.

[0006] Molded spacer foam having perforations has been employed for improving breathability and air circulation. While such perforated foam does improve circulation, circulation is still somewhat limited due to the proximity of the cells that make up the foam material.

[0007] A spacer fabric can provide support and air circulation. However, spacer fabrics have not been employed for use in a brassiere, perhaps because the known methods of perforation or pattern forming weaken the spacer fabric,

causing it to tear or fray. For example, the perforation process subjects the spacer fabric to shearing-induced stresses that may cause an edge of a perforation to fray or tear.

[0008] Therefore, a need exists for a brassiere that has a perforated spacer fabric for increasing breathability and comfort, but that does not weaken the spacer fabric so that the spacer fabric tears or frays along the edges of the perforations.

SUMMARY OF THE INVENTION

[0009] It is an object of the present invention to provide a brassiere having increased support in the breast cups.

[0010] It is another object of the present invention to provide a brassiere with breathability in the breast cup areas, especially in the breast cups.

[0011] It is still another object of the present invention to provide a brassiere with a molded breast cup with a spacer fabric.

[0012] It is still yet another object of the present invention to provide a brassiere with a molded breast cup with a spacer fabric and having an inner fabric portion and an outer fabric portion secured by sewing to or about the spacer fabric.

[0013] It is yet another object of the present invention to provide a molded breast cup with a molded spacer fabric having one or more breathable structures.

[0014] It is yet another object of the present invention to provide a molded breast cup with a molded spacer fabric having perforations and a pattern formed by the perforations therein.

[0015] It is a further object of the present invention to provide a method for making a breast cup having a pattern of perforations formed in a spacer fabric so that the spacer fabric does not tear or fray.

[0016] It is yet a further object of the present invention to provide a method for making a breast cup from a spacer fabric with a desired pattern of perforations formed in the spacer fabric.

[0017] These and other objects and advantages of the present invention are provided by a brassiere having breast cups with a molded spacer fabric or layer that can receive perforations or air pockets, preferably as part of a desired pattern, and having an inner fabric layer and, preferably, an outer fabric layer that are sewn or connected to/or connected about the molded spacer layer on separate sides thereof. The spacer fabric with perforations allows air circulation in the breast area.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The foregoing will be more apparent from the following detailed explanation of the preferred embodiments of the invention in connection with the accompanying drawings.

[0019] Fig. 1 illustrates a perspective view of a brassiere having breast cups with a perforated molded spacer portion, according to the present invention;

[0020] Fig. 2 is a partial rear view of the brassiere of Fig. 1;

[0021] Fig. 3 is an exploded cross section of the brassiere of Fig. 1 along line 3-3;

[0022] Fig. 4 is a plan view of one surface of the spacer fabric used in the brassiere of Fig. 1;

[0023] Fig. 5 is a sectional view of a cutter for perforating the molded spacer portion according to the present invention; and

[0024] Fig. 6 is a pictorial view of the molded breast cup.

DETAILED DESCRIPTION OF THE INVENTION

[0025] Referring to the drawings and, in particular Figs. 1 and 2, there is provided a brassiere generally represented by reference numeral 100. The brassiere 100 has a pair of

breast cups 200, a center gore 110 positioned between the pair of breast cups, and a pair of side panels 120 (only one of which is shown). Each of the pair of side panels 120 is connected to a different one of the pair of breast cups 200.

[0026] Referring to Figs. 1 through 3, each breast cup 200 is preferably a molded cup. Each breast cup 200 has an inner fabric material or layer 210, an outer fabric material or layer 230, and a spacer fabric or layer 220 therebetween. The spacer layer 220 is preferably positioned between the inner layer 210 and the outer layer 230. The spacer layer 220 can be entirely perforated or only perforated in a portion that preferably is a lower edge 205 of each breast cup 200 as shown in Figs. 1 through 3. The spacer layer 220, in either embodiment, provides breathability to the wearer's breasts, as well as support to the pair of breast cups 200. Thus, spacer layer 220 provides support and, at a critical portion of the wearer's breasts, breathability, to each breast cup 200.

[0027] Preferably, the series of perforations 226 form a horizontally disposed arching pattern at a location of the breast cups 200 where each breast lays. The perforations 226 being shown in Fig. 1 are in the horizontally disposed arching pattern on the breast cup 200 adjacent to the lower edge 205. The perforations 226 are preferably located on a bottommost portion or base of each breast cup 200. These perforations 226 are arranged in the pattern to allow for adequate air circulation and to allow air to cool a portion of the breast cup 200 where the breast lays. The perforations 226 are disposed across the base of each breast cup 200, however one skilled in the art should appreciate that any number or size

perforations may be used and is within the scope of the present invention to facilitate cooling of the breast laying in the breast cup 200. Alternatively, the perforations 226 may be disposed at an arc, or portion of the curve of the lower edge 205 of the pair of breast cups 200 to cool the breast in the breast cups.

[0028] Referring to Fig. 4, the spacer layer 220 has a spacer material or fabric. The spacer material has a first or outer surface 222 and a second or inner surface (not shown), opposite the outer surface. In a preferred embodiment, the first surface 222 has a series of patterned valleys or dimples 224. The dimples 224 allow for enhanced air circulation, while the inner surface is smooth. In less preferred embodiments, the first or outer surface 222 can have the dimples 224 or be smooth, and the inner surface can have the dimples or be smooth, or any combinations of these features.

[0029] As shown in Figs. 1 and 2, the spacer fabric 220 has a series of perforations 226 that form a floral pattern. These perforations 226 may form any pattern that allows for adequate air circulation. Some examples of such patterns include, but are not limited to, one or more hearts, spirals, letters, a logo, free-form designs, or any combinations thereof. Most preferably, the design is a flower, however one skilled in the art should appreciate that any design may be used and is within the scope of the present invention.

[0030] The inner layer 210, which contacts the breasts of the wearer, is made of any known fabric material in the art that is used as the inner surface or lining of a brassiere.

Such fabric materials can be mono-filament and/or multi-filaments. Such fabric materials include, but are not limited to, microfiber, cotton, nylon, spandex such as Lycra, power mesh, or any combinations thereof. Preferably, inner layer 210 is made of power mesh. The outer layer 230 is made of any fabric material used as a conventional outer layer of a brassiere. Such conventional outer layer fabric materials, that can be mono-filament and/or multi-filaments, include, but are not limited to, microfiber, cotton, nylon, spandex such as Lycra, power mesh, or any combinations thereof. Preferably, the outer layer 230 is made of the power mesh. More preferably, the inner and the outer layers 210, 230 should be made of a material that allows perforations 226 to be visible, thereby enhancing the aesthetics of brassiere 100, and improving the overall breathability of breasts cups 200.

[0031] In a less preferred embodiment of the present invention, the brassiere is a two-layer structure in which the spacer fabric 220 is the outer layer, and the second layer is the inner layer 230.

[0032] The spacer layer 220 is preferably a spacer fabric or material. Such spacer material can be, but is not limited to, a mono-filament and/or multi filaments. It can be made of polyester, microfiber, cotton, nylon, spandex such as Lycra, power mesh, or any combinations thereof. Preferably, the spacer material is a multi-filament polyester spandex. As discussed above, in a preferred embodiment, one surface, the outer surface, has a number of dimples 224 in a pattern.

[0033] Each breast cup 200 preferably has the inner layer 210 and the outer layer 230, with the spacer layer 220 therebetween, joined peripherally, thereby enclosing the spacer layer. The inner and the outer layers 210, 230 may be joined by any method known in the art including, but not limited to, sewing, gluing, riveting or ultrasonically connecting. Preferably, sewing is used so that a seam line 260 is formed as shown in Figs. 1 and 6. In the most preferred embodiment, spacer layer 220 is molded, and then outer layer 230 and inner layer 210 are made of the power mesh fabric and are sewn about the spacer fabric.

[0034] The significant aspects of the process of making breast cups 200 of brassiere 100 are as follows. The spacer layer 220 is preferably molded to form the molded shape breast cups 200. This molding uses an impression mold that is heated to about 400 degrees Fahrenheit for about 50 to about 55 seconds.

[0035] Then, the molded spacer layer 220 is placed under a single headed device. This single headed device has an anvil or a cutter structure 300 as shown in Fig. 5, and a smooth horn (not shown) that mates with the anvil. In a preferred embodiment, the anvil 300 is stationary and the horn moves toward the anvil. When the horn moves in close proximity to anvil 300, a predetermined amount of ultrasonic energy is applied so that a desired pattern of perforations 226, preferably to form the flower pattern, is formed in each molded breast cup 200 as shown in Figs. 1 through 3 and 6. Preferably, each flower is formed, e.g., cut into each molded breast cup 220, one at a time. Preferably, each pattern is

cut individually, and then the breast cup 200 is rotated about 3 or about 4 times, which produces a number of patterns in each spacer layer 220 or breast cup 200.

[0036] The anvil 300 has a cutting edge or surface 305 with a cutting angle 310. The anvil 300 also has an emboss or embossing area 315, and an open area 320 that separates the cutting edge 305 from the embossing area. The open area 320 is about 1/64 inch to about 1/4 inch wide. Preferably, the open area 305 is about 1/64 inch wide. In a preferred embodiment, the cutting angle 310 is about 120 degrees. However, the cutting edge 305 will function with the cutting angle 310 in the range of about 80 degrees to about 170 degrees. It should be noted that the process of making breast cups 200 of brassiere 100 may be automated and controlled using software having program instructions. In the automated process of making breast cups 200 of brassiere 100, one or more anvils or cutter structures 300 may be on a roller (not shown) for improved assembly.

[0037] Known prior art perforation methods that employ single head cutters shear or fray an edge of the cut material. This leads to poor quality and it has been observed that this fraying will reduce the life of the garment. The anvil 300, with a cutting edge 305 having about a 120-degree angle, eliminates the shearing stresses induced by prior art cutters. Additionally, the open area 320 adds strength to molded spacer layer 220 during cutting by enlarging or "puffing up" around the pattern or area to be cut. Simultaneously, the embossing area 315 flattens the pattern of the molded spacer layer 220 holding the pattern taut, thereby assisting in providing a

smooth, non-tearing or non-fraying, cut as shown in 227 in Fig. 6.

[0038] The horn to be used is preferably a coated slick horn. The horn contacts anvil 300 when perforating or forming the pattern in molded spacer layer 220, and cutting the pattern along edge 227. This coated slick horn employs a power booster and a converter. The converter turns an amount of power into a number of ultrasonic vibrations that treat the cut edge 227 with an ultrasonic frequency. The ultrasonic frequency is preferably in a range that includes about 10 kilohertz to about 50 kilohertz. This frequency vibration melts and seals cut edge 227. The anvil 300 therefore simultaneously perforates or forms the pattern and prevents, with the applied ultrasonic energy, the edge 227 cut edge from unraveling or tearing. Referring again to Fig. 6, the pattern has a series of perforations 226 and yet a finely defined edge 27 that is about 1/64 of an inch from the pattern or perforations 226.

[0039] The breast cups 200 are depicted here in the context of one form of brassiere. However, it is conceivable that breast cups 200 can be used for any garment or article of apparel, such as, but not limited to athletic brassieres, swimsuits, shirts, a coat, lingerie, or any other article of clothing being known in the art.

[0040] The present invention has been described with particular reference to the preferred embodiments. It should be understood that the foregoing descriptions and examples are only illustrative of the present invention. Various

alternatives and modifications thereof can be devised by those skilled in the art without departing from the spirit and scope of the present invention. Accordingly, the present invention is intended to embrace all such alternatives, modifications, and variations that fall within the scope of the appended claims.